Cypraea: A List of the Species

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Of interest to collectors, malacologists, students, specialists, and others, is a definitive list of the living species comprising the genus *Cypraea s.l.* This field is, unfortunately, a rather fluid one, and specific names flit in and out, appear, then disappear into synonymy with disconcerting frequency. It is probably not fair to place the entire blame for this state of affairs on the controversy between the splitters and the lumpers, because the ever increasing activity of collectors in the field continually makes additional material available to the specialists for analysis and study. The literature on *Cypraea* is, as is well-known, vast, scattered, and confusing, and it is accordingly impossible, indeed, inadvisable, to attempt a complete review of all of the developments which have taken place since the original enumeration of the genus by Linnaeus. We choose, instead, as a starting point, the familiar Prodrome of the Schilders (1938 - 1939). In this paper, which is still a standard reference, 165 species were listed. Some, but not all, of the developments since then are traced below, with the emphasis, of course, placed on the work of Schilder.

In 1940, in a paper on the distribution and abundance of Cypraeidae, the Schilders (1940a) listed the same 165 species, but in a drastically altered systematic order. It seems appropriate to point out that this revised order is the one used by the Schilders in their subsequent publications, and that, notwithstanding, the previous order used by them in the Prodrome is the one usually used by other authors up to the present time.

The Schilders (1940b) then increased the number of species to 171 by elevating 6 former subspecies to specific rank. These are: *listeri* (from *felina*), *acicularis* (from *spurca*), *eburnea* (from *miliaris*), *succincta* (from *onyx*), *tortirostris* (from *chinensis*), and *thersites* (from *friendii*).

Shortly thereafter Schilder (1941), in a paper on the affinity and distribution of Cypraeacea, tabulated the large number of known fossil and recent examples of the superfamily, and at the same time reduced the number of living species of *Cypraea s. l.* to 156 by lowering 15 former species to subspecific rank. These are: *acicularis* (into *spurca*), *eburnea* (into *miliaris*), *succincta* (into *onyx*), *tortirostris* (into *chinensis*), *thersites* (into *friendii*), *maculifera* (into *histrio*), *broderipii* (into *nivosa*), *leviathan* (into *carneola*), *macandrewi* (into *beckii*), *gambiensis* (into *zonaria*), *petitiana* (into *pyrum*), *nigropunctata* (into *arabicula*), *comptoni* (into *piperita*), *mayi* (into *angustata*), and *hesitata* (into *armeniaca*). It may be noted that the first five of these pairs are among the six which had just previously been split (see preceding paragraph).

Somewhat later, Steadman & Cotton (1946) published a key to the subfamilies and genera of Cypraeidae, and addended a systematic list of 172 species. The order in this list is roughly that used by the Schilders (1938 to 1939); the differences in the assignments among the genera need not concern us here. What is of interest, on the other hand, is the increase of seven in the number of species over the 165 listed in the Prodrome of the Schilders. Unfortunately, this increase is not due merely to the splitting off of seven subspecies by Steadman & Cotton. Detailed analysis of the two lists shows that Steadman & Cotton included 26 taxa as species which were either unknown to or ignored by the Schilders, or which they classed as subspecies or synonyms. Conversely, the Schilders included 19 taxa as species which Steadman & Cotton either classed as subspecies or relegated to the synonymy of other species. It is this rather messy situation which leads to the net increase of seven mentioned above. The classification of Steadman & Cotton follows closely that of others of the Australian school - notably Iredale - and it has not won universal acceptance. For this reason, interesting though they may be, the individual differences between the list of Steadman & Cotton on the one hand and that of the Schilders on the other hand will not be detailed here. It would seem, however, that the total number of these differences is considerably larger than one would expect to find between different authorities.

In the next catalog of the Schilders (1952[2]) the 165 species listed are identical with those of the Prodrome.

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[1] Contribution No. 267.

[2] Written in 1940, but (due to WW II) not published until 1952.

The compilation by Allan (1956) includes approximately 171 species. This work follows closely the list and arrangement of Steadman & Cotton, but does not always make it clear just what her analysis of the situation is. She apparently assigns specific rank to five subspecies of Steadman & Cotton, while at the same time reducing seven of the species of the latter to subspecies or synonyms. Allan also adds one species, *rosselli,* which had been established after the paper of Steadman & Cotton by Cotton (1948). [Note: The reference in Schilder (1961 a) for the original description of *rosselli* is incorrect.]

The subspecies *aequinoctialis* was split from *annettae* by Schilder (1958). [Note: The date 1938 for this reference as given in Schilder (1961 a) is apparently a misprint.]

Next, Schilder (1961 a) listed the new names accepted by him since the publication of the Prodrome. These include one name change, viz., from the preoccupied *arenosa* Gray to *schilderorum* Iredale, the elevation of *aequinoctialis* out of *annettae,* two admissions of former synonyms as species, viz., *ostergaardi,* distinct from *helvola,* and *latior,* distinct from *teres,* and nine newly described species, viz., *langfordi, teramachii, episema, hammondae, euclia, rosselli, wilkinsi, katsuae,* and *raysummersi.* The total increase over the number of species listed in the Prodrome is thus eleven.

Griffiths (1961) then proposed a revision of the subgenus *Notocypraea.* He increased the four *Notocypraea s. l.* of Schilder (1941) to ten by adding the species *comptonii, dissecta, emblema, euclia, moelleri,* and *wilkinsi* to the list.

As a part of a discussion of size variations in cowries, Schilder (1961 b) presented a list of 176 species which was stated to "have been arranged, with some slight emendations, according to the writer's last catalog (Schilder, 1941)." It will be recalled that this last catalog contained 156 species; the "slight emendations" (aside from some minor changes in the systematic order) are: deletion of one species, viz., *waikikiensis,* addition of five new species, viz., *rosselli, ostergaardi, langfordi, teramachii,* and *raysummersi;* elevation of 16 subspecies, viz., *thersites* (from *friendii*), *maculifera* (from *histrio*), *broderipii* (from *nivosa*), *leviathan* (from *carneola*), *margarita* (from *cicercula*), *macandrewi* (from *beckii*), *tomlini* (from *cernica*), *acicularis* (from *spurca*), *eburnea* (from *miliaris*), *gambiensis* (from *zonaria*), *aequinoctialis* (from *annettae*), *petitiana* (from *pyrum*), *nigropunctata* (from *arabicula*), *reticulifera* (from *declivis*), and *bicolor* and *comptonii* (from *piperita*); the overall increase in the number of species is accordingly 20. It should be pointed out that of the above 15 subspecies now classed as species, 11 were among the 15 previously demoted from specific to subspecific rank by Schilder (1941); it is therefore obvious that there is a total difference of opinion with regard to eight species-subspecies in the two lists. Furthermore, of the nine new species accepted by Schilder (1961 a), only four are included in Schilder (1961 b); those omitted are: *episema* (included in *venusta*), *hammondae* (possibly included in *raysummersi* - even though *hammondae* is the prior name), *euclia* and *wilkinsi* (a revision of *Notocypraea* is promised), and *katsuae* (which simply vanished).

Somewhat later, Schilder (1961 c) pointed out some additions to the earlier paper (Schilder, 1961 a). These include recognition of *luchuana* and *katsuae* as species, withholding recognition of the specific status of the recently described *kuroharai* and *musumea* as species (Die Abbildungen . . . sind mir z. Zeit noch unzugänglich"), and a short discussion of the situation with regard to *Notocypraea.*

The list of species compiled by Griffiths (1962) numbers 185. Referring back to the Prodrome, we find that the following twelve have been added: *langfordi, teramachii, wilkinsi, euclia, musumea, raysummersi, hammondae, katsuae, luchuana, episema, rosselli,* and *kuroharai;* the following ten former subspecies or synonyms have been elevated: *thomasi* (from *macandrewi*), *ostergaardi* (from *helvola*), *aequinoctialis* (from *annettae*), *molleri* (from *angustata*), *emblema* (from *angustata*), *dissecta* (from *piperita*), *latior* (from *teres*), *tortirostris* (from *chinensis*), *thersites* (from *friendii*), and *contraria* (from *friendii*); furthermore *mayi* is considered a synonym of *comptonii,* and *waikikiensis* has disappeared into unspecified synonymy.

More recent activity includes the following proposals:

Schilder (1962 a) nominated *titan* as a new species. It is a large African form of *carneola,* but said to be specifically distinct from it.

Schilder (1962 b) elevated *luchuana* to specific status, and placed it intermediate between *pallidula* and *quadrimaculata.*

Schilder (1963 a) nominated *catei* as a new species. The unique shell had previously been recorded as *venusta* (Cate, 1962).

Schilder & Summers (1963) nominated *casta,* a white, unspotted form recalling *comptonii,* as a new species. As an example of the vicissitudes of a new species, the subsequent chronicle of *casta* is of rare interest.

Griffiths (1963) came to the conclusion on the basis of the examination of 25 shells from the same locality, that it was likely that the tendency to albinism (of the form called *casta*) was a function of environment alone, and that it did not merit taxonomic separation (from *comptonii*).

Schilder (1964a) then replied on the basis of certain characteristics of 39 specimens, that *casta* was not an extreme variant of *comptonii*, but rather a mutant deserving of taxonomical separation (at the species level as implied by the title of the paper).

Brand (1964) reported the results of the examination of 26 specimens, and concluded that there was an uninterrupted series from the "dark end" of *comptonii* to the "white end" of *casta*, but then, curiously, stated that the name *casta* was essential for clarity even if it did not represent a true species.

Griffiths (1964a) then asserted, after a short discussion of the statistical data of Schilder (1964a) and Brand (1964) that it was not possible to accept the name *casta* for clarity, as Brand suggested, unless the species were accepted, but that the International Rules clearly forbade that position.

Finally (it is to be hoped), Schilder (1964b) demoted *casta* from specific rank to that of, in his notation, an infraspecies of a subspecies (*comptonii*) of the species *piperita*.

A new species, *dayritiana*, was nominated by Cate (1963). It was described as being related to *coxeni, luchuana, pallidula, interrupta*, and *quadrimaculata*, but, of course, specifically distinct from them.

The total number of living cowrie species was then placed at 170 by Schilder (1963b) in a paper on nomenclatorial problems. This number was stated to have been arrived at by adding the number of cowrie species discovered since 1941 to those in "my last catalog", i.e., Schilder, 1941. The number of living species in Schilder (1941) is 156; it therefore follows that Schilder considers that 14 species were discovered since then, unless the number 170 is a misprint. There is an obvious discrepancy here, because the number of species listed in Schilder (1961b) is 176. A possible explanation here is that the "170" of Schilder (1963b) should read "180", in which case four species described since 1961 must be added to the list of Schilder (1961b). It just so happens that four new species were in fact created during that period, viz., *titan, luchuana, catei*, and *dayritiana* (see above).

The status of *kuroharai* and *katsuae* was then discussed by Schilder (1963c) in a short paper, in which they both were recognized as species. In this same paper *musumea* was said to be indistinguishable from *katsuae*.

The list of Cernohorsky (1963) enumerates 186 species, with two more added in the Addenda. The excess of eight over 180 comes about as follows: Cernohorsky reduces *tomlini* and *acicularis* to subspecies (of *cernica* and *spurca* respectively), but adds ten species by accepting the ten *Notocypraea* of Griffiths (1961) in place of the seven of Schilder (1963), listing *hesitata* as distinct from *armeniaca, raysummersi* as distinct from *hammondae, tortirostris* as distinct from *chinensis, summersi* as distinct from *pallidula*, and accepts *katsuae, kuroharai*, and *musumea*. The situation is not quite that simple, however, for Cernohorsky, at the end of his list, classes *aequinoctialis, armeniaca, latior, listeri, raysummersi, titan* and *tortirostris* as "doubtful *Cypraea* species." To further complicate things, this list of doubtful species, which comes after the presumably definitive list, is inconsistent with some of the "notes" which follow. It is mentioned in the notes that further research is necessary in the case of *armeniaca*, stated that it is doubtful that *latior* is a valid species, and suggested that *raysummersi* might prove to be a subspecies of *hammondae*. (The same opinion was recently attributed to R. H. Summers by an anonymous (1963) author. On the other hand, Griffiths (1964b) expressed the opinion that *hammondae* and *raysummersi* were both distinct, valid species, on the basis of considerable and distinct differences between them.) Moreover, Cernohorsky does not give his reasons for the doubts concerning *aequinoctialis* and *listeri*, the questioning of *tortirostris* is equivocal, and, finally, *titan* is not questioned, but accepted. Even more contradictory is the rejection, in the notes, of species not included in the "doubtful" category, viz., *margarita* and *musumea*, and the implication that *katsuae* is the Japanese race of *hammondae; margarita*, which was considered a subspecies by the Schilders in the Prodrome, in 1940a and 1940b, and by Schilder in 1941, but elevated by him in 1961b, is considered by Cernohorsky to be merely an extreme variant of *cicercula*, an opinion with which Schilder, in a private communication, is stated to concur, while *musumea* is stated "with all probability" to be identical with *katsuae* (the reasons why Cernohorsky retained *margarita* and *musumea* in his list are not given). With regard to *summersi*, to which Cernohorsky accords specific status, additional (later) opinions support this conclusion, such as those of R. H. Summers (see Anonymous 1963) and Cernohorsky (1964a and 1964b).

The *Notocypraea* tangle was recently unravelled by Schilder (1964b), who allowed four or five species, namely, *pulicaria, bicolor, piperita, angustata*, and, possibly, *declivis*.

Schilder & Schilder (1964) then listed 160 species, as well as 41 "well-recognizable" subspecies, in an interesting paper which gives the lengths of the largest and smallest known examples of each species. The systematic order, with a number of minor rearrangements, follows that of Schilder (1961 b). It should be noted that the total of 160 differs not only from the 176 of Schilder (1961 b), but also from the 170 (conjectured above, apparently erroneously, to be a misprint for 180) of Schilder (1963 b). The decrease of 16 from 176 to 160 comes about as follows: four new species, *catei, rabaulensis, katsuae,* and *luchuana,* are added; one former subspecies, *superstes* is accorded specific status (split from *martini*); one species, *leviathan,* disappears from the list (and hence is not now considered an even well-recognizable subspecies); and 20 species are demoted to subspecies, *mexicana* into *isabella, cervinetta* into *cervus, obvelata* into *annulus, tomlini* into *cernica, ostergaardi* into *boivinii, acicularis* into *spurca, nebrites* into *erosa, eburnea* and *lamarcki* into *miliaris, granulata* into *nucleus, gambiensis* into *zonaria, petitiana* into *pyrum, aequinoctialis* into *annettae, reticulifera* (as *occidentalis*) into *bicolor, comptonii* into *piperita, declivis* into *angustata, listeri* into *felina, latior* into *rashleighana, subteres* into *teres,* and *coloba* into *chinensis.* It is interesting that *dayritiana* is classed as a subspecies of *luchuana, raysummersi* as a subspecies of *hammondae,* that *titan* and *summersi* do not even appear as "well-recognizable" subspecies, and that *margarita* is listed as a distinct species. Finally, a species accepted in 1963, *kuroharai,* is not on the list.

The list of Wagner & Abbott (1964) contains 163 species of *Cypraea,* in alphabetical order. As might be expected, the difference of three between this list and the 160 species of Schilder & Schilder (1964) does not arise in a simple way. Analysis of the two lists reveals the following differences: relative to the species of the Schilders, Wagner & Abbott consider 14 of them subspecies, viz., *artuffeli* (of *clandestina*), *bicolor* (of *piperita*), *catholicorum* (of *esontropia*), *diluculum* (of *ziczac*) *erythraeensis* (of *stolida*), *grayana* (of *depressa*), *hammondae* (of *gracilis*), *kieneri* (of *ursellus*), *luchuana* (of *pallidula*), *macandrewi* (of *beckii*), *margarita* (of *cicercula*), *minoridens* (of *microdon*), *owenii* (of *ursellus*), *and serrulifera* (of *microdon*); in addition, *ovum* is included in the synonymy of *errones, fuscodentata* in that of *angustata, superstes* in that of *martini,* and *catei* in that of *venusta,* while four names not in the Schilder-Schilder list are used: *coffea* (considered by Schilder & Schilder (1938) a synonym of *ursellus*), *darwini* (apparently a sub-fossil specimen of *nigropunctata,* according to Schilder (1961 a)), *facifer* (a subspecies of *limacina* in Schilder & Schilder (1938)), and *verconis* (a subspecies of *angustata* in (1964 b)). [Note: Wagner & Abbott use *angustata* for the South African species called *fuscodentata* by Schilder, and *verconis* for the South Australian species called *angustata* by Schilder.] Furthermore, Wagner & Abbott assign specific rank to the following 18 taxa classed as subspecies by Schilder & Schilder (1964): *casta, cervinetta, coloba, declivis, eburnea, granulata, hesitata, kuroharai, lamarckii, latior, moelleri, musumea, ostergaardi, raysummersi, thomasi, titan, tomlini,* and *wilkinsi.* It is interesting that nine of these are among the 20 recently demoted by the Schilders (1964), and that Wagner & Abbott really give ambiguous status to *casta* ("may be *comptoni*"), *raysummersi* ("may be *hammondae*"), and *titan* ("probably large *carneola* with aberrant radula"). Finally Wagner & Abbott make no mention of *rabaulensis*: one suspects that this is the unique, undescribed specimen alluded to by Summers (see Anonymous, 1963). This suspicion is confirmed by the recent paper by Schilder (1964 c) in which *rabaulensis* is nominated as a new species, on the basis of a unique specimen in the Summers collection.

CONCLUSION

As must be obvious from the foregoing discussion, it is not possible at the present time - indeed, one doubts whether it will ever be possible - to devise a definitive list of the species of living *Cypraea.* It is probably expecting too much to hope that unanimity will ever be attained among the numerous authorities. Accordingly, we present four lists: first, 142 "non-controversial" species recognized both by Schilder (1964) and by Wagner & Abbott (1964); second, 18 "provisional" species recognized by Schilder, but not by Wagner & Abbott; third, 18 "provisional" species definitely recognized by Wagner & Abbott but not by Schilder; and fourth, 29 "controversial" species, i. e., most of those which at one time or another during the past quarter century have been accorded specific status. Following each entry in the second, third, and fourth lists is given, in parentheses, the species of List One to which each of the subspecies or synonyms(as presently considered) comprising these three lists is assigned. In view of the past history of this field, it should not be surprising to find, at some future date, some of the occupants of the last three lists transferred to List One (or vice versa). Because the systematic arrangement is in a state of flux, the order in all four lists is alphabetical, for easy reference.

LIST ONE

Non-controversial species

achatidea
albuginosa
algoensis
amphithales
angustata
annettae
annulus
arabica
arabicula
argus
armeniaca
asellus
aurantium
barclayi
beckii
bistrinotata
boivinii
broderipii
camelopardalis
capensis
caputdraconis
caputserpentis
carneola
caurica
cernica
cervus
childreni
chinensis
cicercula
cinerea
citrina
clandestina
contaminata
coxeni
cribellum
cribraria
cumingi
cylindrica
decipiens
depressa
dillwyni
edentula
eglantina
erosa
errones
esontropia
exusta
felina
fimbriata
friendii
fultoni
fuscodentata
fuscorubra
gangranosa
gaskoini
globulus
goodalli
gracilis
guttata
helvola
hirasei
hirundo
histrio
hungerfordi
interrupta
irrorata
isabella
katsuae
labrolineata
langfordi
lentiginosa
leucodon
limacina
lurida
lutea
lynx
maculifera
mappa
marginalis
marginata
mariae
martini
mauritiana
microdon
miliaris
moneta
mus
nigropunctata
nivosa
nucleus
ocellata
onyx
pallida
pallidula
pantherina
picta
piperita
poraria
pulchella
pulchra
pulicaria
punctata
pyriformis
pyrum
quadrimaculata
rashleighana
reevei
robertsi
rosselli
sanguinolenta
saulae
schilderorum
scurra
semiplota
spadicea
spurca
staphylaea
stercoraria
stolida
subviridis
sulcidentata
surinamensis
talpa
teramachii
teres
tessellata
testudinaria
teulerei
thersites
tigris
turdus
ursellus
valentia
ventriculus
venusta
vitellus
vredenburgi
walkeri
xanthodon
zebra
ziczac
zonaria

LIST TWO

"Provisional" species, recognized by Schilder

artuffeli (clandestina)
bicolor (piperita)
catei (venusta)
catholicorum (esontropia)
diluculum (ziczac)
erythraeensis (stolida)
grayana (depressa)
hammondae (gracilis)
kieneri (ursellus)
luchuana (pallidula)
macandrewi (beckii)
margarita (cicercula)
minoridens (microdon)
ovum (errones)
owenii (ursellus)
rabaulensis
serrulifera (microdon)
superstes (martini)

LIST THREE

"Provisional" species, not recognized by Schilder

cervinetta (cervus)
coffea (ursellus)
coloba (chinensis)
darwini (nigropunctata)
declivis (angustata)
eburnea (miliaris)
facifer (limacina)
granulata (nucleus)
hesitata (armeniaca)
kuroharai (schilderorum)
lamarckii (miliaris)
latior (rashleighana)
moelleri (angustata)
musumea (katsuae)
ostergaardi (boivinii)
thomasi (macandrewi)
tomlini (cernica)
wilkinsi (bicolor)

LIST FOUR

Controversial species

acicularis (spurca)
aequinoctialis (annettae)
bregeriana (walkeri)
casta (piperita)
comptonii (piperita)
contraria (friendii)
dayritiana (luchuana)
dissecta (piperita)
emblema (angustata)
episema (venusta)
euclia (bicolor)
gambiensis (zonaria)
icterina (moneta)
leviathan (carneola)
listeri (felina)
mayi (piperita)
mexicana (isabella)
nebrites (erosa)
obvelata (annulus)
pericalles (pulchella)
petitiana (pyrum)
raysummersi (hammondae)
reticulifera (bicolor)
subteres (teres)
succincta (onyx)
summersi (pallidula)
titan (carneola)
tortirostris (chinensis)
waikikiensis (fimbriata)

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